

Appl. No. 10/665,995

Amtd. Dated June 10, 2005

Reply to Office Action of March 10, 2005

Amendments to the Specification:

Please replace paragraph [0003] with the following amended paragraph:

[0003] Referring to Fig. 6, ~~[[an]]~~ a typical LCD assembly 100 comprises an LCD panel 101 and a backlight system 102. The backlight system 102 comprises a light source 1021, a light source cover 1022, a reflection plate 1023, a light guide plate 1024, and a reflection polarizer 1025. The light emitted from the light source 1021 enters ~~into~~ the light guide plate 1024 directly, or indirectly by being reflected by the light source cover 1022. The reflection plate 1023 disposed under the light guide plate 1024 reflects light coming from the light guide plate 1024 back into the light guide plate 1024. Outgoing light from the light guide plate 1024 to the reflection polarizer 1025 is composed of different components of polarized ~~lights~~ light, i.e., P polarized light and S polarized light. The two polarized light components' polarization axes are perpendicular to each other. The S polarized light has proper polarization and passes through the reflection polarizer 1025, and is used to illuminate the LCD panel 101. The P polarized light is reflected by the reflection polarizer 1025 and ~~reenter~~ reenters the light guide plate 1024. Reflected again by the reflection plate 1023, the P polarized light is turned into ~~[[a]]~~ common light which can be seen as a combination of P polarized light and S polarized light as before, but just with a lower intensity.

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This common light is then directed to the reflection polarizer 1025 and is partly passed and partly reflected back. The process repeats again and again, so that the P polarized light reflected by the reflection polarizer 1025 is reused.

Please replace paragraph [0004] with the following amended paragraph:

[0004] Although the P polarized light reflected by the reflection polarizer 1025 is reused, much of it is also lost in the process. This is because, when the P polarized light is reflected by the reflection polarizer 1025 to enter ~~into~~ the light guide plate 1024, part of the P polarized light is absorbed by the light guide plate 1024[[:]], In addition, the residual light then [[will]] also [[lose]] loses a little strength when it is reflected by the reflection plate 1023. In the whole recycling process, ~~the loss can not~~ these losses cannot be ~~neglected~~ ignored.

Please replace paragraph [0005] with the following amended paragraph:

[0005] At the same time, the backlight system does not use a diffusing plate or other apparatus having a similar function to scatter the light. This causes an unevenness of the light emitted from the reflection polarizer 1025, so that [[an]] illumination provided to the LCD panel 101 is not ~~satisfying~~ satisfactory.

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Please replace paragraph [0006] with the following amended paragraph:

[0006] Referring to FIG. 7, U.S. ~~Pat. No. 6,448,955~~ Pat. No. 6,448,955, issued Sep. 10, 2002, discloses an LCD assembly 200, which comprises a liquid crystal panel 201 and a backlight system 202. The liquid crystal panel 201 comprises a first plate 2011, a liquid crystal layer 2012, and a second plate 2013. The backlight system 202 comprises two light sources 2021, two corresponding light source covers 2022, two corresponding light guide plates 2024, a reflection plate 2023, a diffusion plate 2025, a brightness enhancing film 2026, a reflection polarizer 2027, and a special cover layer 2028.

Please replace paragraph [0007] with the following amended paragraph:

[0007] In operation, ~~[[The]]~~ the light emitted from the two light sources 2021 enters ~~into~~ the two light guide plates 2024 directly, or indirectly after being reflected by the light source cover 2022. With the reflection plate 2023 disposed under the two light guide plates 2024, the outgoing light from the two light guide plates 2024 is directed to the diffusion plate 2025. Then the diffused light enters ~~into~~ the brightness enhancing film 2026. The incident light at the reflection polarizer 2027 can be seen as a combination of two parts, i.e., the P polarized light and the S polarized light, and their polarization axes are perpendicular to each

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other. Having the proper polarization, the S polarized light passes through the reflection polarizer 2027 and is used to illuminate the LCD layer 2012; and the P polarized light is reflected by the reflection polarizer 2027 to enter the light guide plate 2024 through the brightness ~~enhance~~ enhancing film 2026 and the diffusion plate 2025. Reflected by the reflection plate 2023, the P polarized light is turned into common light which can be seen as a combination of P polarized light and S polarized light, as before, but with a lower intensity. This common light is then directed to the reflection polarizer 2027, and is partly passed~~[[,]]~~ and ~~[[is]]~~ partly reflected back. This process repeats again and again, so that the P polarized light reflected by the reflection polarizer 2027 is reused.

Please replace the first paragraph [0008] with the following amended paragraph:

[0008] The addition of the diffusion plate 2025 makes the final light more uniform;~~the using, and the use~~ of the brightness enhancing film 2026 enhances the utilization efficiency of the light. ~~But~~ However, there is still one problem unsolved. When the P polarized light is reflected by the reflection polarizer 2027 to enter the light guide plates 2024, part of the P polarized light is absorbed by the light guide plates 2024~~[[,]]~~, and the residual light then ~~will lose~~ loses a little intensity when it is reflected by the reflection plate 2023. ~~Remembering~~ Given that there is a diffusion plate 2025 added to the system, ~~[[so]]~~ in the whole process, the ~~[[loss]]~~ losses due to absorbance and reflection ~~will~~ amount to a quite large percentage proportion.

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Please replace the first paragraph [0009] with the following amended paragraph:

[0009] It is desirable to provide a backlight system and a light guide plate used therein which ~~overcomes~~ overcome the above problems.

Please replace the second paragraph [0007] with the following amended paragraph:

~~[0007]~~ [0009.1] An object of the present invention is to provide a backlight system that provides a uniform and more intense light, and consumes less power.

Please replace the second paragraph [0008] with the following amended paragraph:

~~[0008]~~ [0009.2] A backlight system of the present invention comprises a light source, a light guide plate, a reflection plate, a diffusion plate, and a reflection polarizer. The light source is disposed at one side of the light guide plate. The reflection plate, the light guide plate, the diffusion plate and the reflection polarizer are stacked one ~~[[up]]~~ upon the other. A plurality of prisms are disposed on a surface of the diffusion plate, ~~which forms thereby defining~~ a plurality of V-shaped grooves. The reflection polarizer ~~[[lets]]~~ allows light polarized in one certain direction ~~which will be~~ (called ~~[[the]]~~ S polarized light) ~~[[,]]~~ to pass, and reflects light polarized ~~[[,]]~~ in a direction perpendicular to ~~[[the]]~~ said certain direction; ~~which light will be~~ (called ~~[[the]]~~ P polarized light).

Please replace the second paragraph [0009] with the following amended paragraph:

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~~{0009}~~ [0009.3] The prisms can function as light conversion elements to turn the P polarized light reflected by the reflection polarizer ~~[[to]]~~ into common light, which can be seen as a combination of the P polarized light and the S polarized light. ~~[[So]]~~ Therefore the process of conversion is much simplified since only one reflection is used. The relatively large absorbance losses in ~~[[the]]~~ light guide ~~plate, as plates of~~ the prior art~~[[,]]~~ is avoided, and the utilization efficiency of the light is enhanced.

Please replace paragraph [0010] with the following amended paragraph:

[0010] Other objects, advantages and novel features of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings~~[[,]]~~; in which:

Please replace paragraph [0017] with the following amended paragraph:

[0017] Fig. 7 is a cross-sectional view of another conventional liquid crystal display assembly; and

Please replace paragraph [0018] with the following amended paragraph:

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[0018] Fig. 8 is an exploded optical paths schematic view of part of the liquid crystal display module in assembly of Fig. 7[[:]], showing essential optical paths thereof.

Please replace paragraph [0019] with the following amended paragraph:

[0019] Referring to Fig. 1, a first embodiment of a backlight system 300 according to the present invention comprises a light source 3021, a light source cover 3022, a reflection plate 3023, a light guide plate 3024, a diffusion plate 3025, and a reflection polarizer 3027. The 3027. The light source 3021 is disposed at one side of the light guide plate 3024, and is surrounded by the light source cover 3022 on three sides. The reflection plate 3023, the light guide plate 3024, the diffusion plate 3025 and the reflection polarizer 3027 are stacked up one on top of the other. A plurality of prisms ~~11~~ (see 11 (see FIG 3)) are disposed on a surface of the diffusion plate 3025, ~~which forms thereby defining~~ a plurality of V-shaped ~~grooves~~ (not grooves (not labeled)).

Please replace paragraph [0020] with the following amended paragraph:

[0020] Referring to Fig. 2, the light emitted from the light source 3021 enters into the light guide plate 3024 directly, or indirectly by being reflected by the light source cover 3022. With the reflection plate 3023 disposed under the light guide plate 3024, the light emitted from the ~~[[two]]~~ light guide plate 3024 is directed to

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the diffusion plate 3025. The diffused incident light at the reflection polarizer 3027 can be seen as a combination of two parts, i.e., a P polarized light and an S polarized light, and their polarization ~~axes~~ axes are perpendicular to each other. Having a proper polarization state, the S polarized light passes the reflection polarizer 3027; and the P polarized light is reflected back by the reflection polarizer 3027 to the diffusion plate 3025. Reflected by the V-shaped grooves formed by the prisms 11 on the diffusion plate 3025, the P polarized light is turned ~~[[to]]~~ into common light, which can be seen as the combination of the P polarized light and the S polarized light as before, but just with a lower intensity. This common light is then directed to the reflection polarizer 3027, and is partly passed~~[[,]]~~ and ~~[[is]]~~ partly reflected back. This process repeats again and again, so that the P polarized light reflected by the reflection polarizer 3027 is reused.

Please replace paragraph [0021] with the following amended paragraph:

[0021] The plurality of prisms 11 form V-shaped grooves, which serve as light conversion elements to turn P polarized light ~~[[to]]~~ into common light only by reflection action. Unlike the prior art devices, there is no light guide plate or diffusion plate in the light path~~[[, so]]~~. Thus, the conversion process generates only loss by reflection, ~~the loss and any losses that would otherwise be~~ caused by



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the absorption in ~~the~~ a light guide plate or in a diffusion plate ~~of the light is~~ are obviated. Consequently, the utilization efficiency of the light is increased.

Please replace paragraph [0022] with the following amended paragraph:

[0022] Referring to Fig. 3, the plurality of prisms 11 are disposed parallel on a surface of the diffusion plate 3025 at equal intervals, ~~which forms~~ thereby defining a plurality of V-shaped ~~grooves~~(not grooves (not labeled)).

Please replace paragraph [0023] with the following amended paragraph:

[0023] Referring to Fig. 4, a plurality of pyramid-shaped prisms 12 are disposed evenly on a surface of the diffusion plate 3025, ~~which forms~~ thereby defining V-shaped parallel grooves in two perpendicular directions on a surface of the diffusion plate 3025.

Please replace paragraph [0024] with the following amended paragraph:

[0024] Referring to Fig. 5, a second embodiment of a backlight system 400 according to the present invention comprises a light source 4021, a light source cover 4022, a reflection plate 4023, a wedge shaped light guide plate 4024, a diffusion plate 4025, a brightness enhancing film 4026, and a reflection polarizer 4027. ~~The 4027.~~ The light source 4021 is disposed at a wider side of the light guide plate 4024, and is surrounded by the light source cover 4022 on three sides.

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The reflection plate 4023, the light guide plate 4024, the diffusion plate 4025, the brightness enhancing film 4026 and the reflection polarizer 4027 are stacked up one on top of another. The V-shaped grooves formed by the prisms 2 on the light diffusion plate 4025 are a light conversion element which has a same function as in the first embodiment.

Please replace paragraph [0025] with the following amended paragraph:

[0025] The differences between the first and second embodiments comprise three points. The first is the usage of the wedge shaped light guide plate 4024 instead of the flat plate 3024; the second is the reflection film 4023 being formed on the light guide plate 4024 as a substitute for the reflection plate 3023; and the third is the addition of the brightness enhancing plate 4026 between the diffusion plate film 4025 and the reflection polarizer 4027.

Please replace paragraph [0026] with the following amended paragraph:

[0026] Accomplishing the light conversion with the grooves formed by the prisms 2, the second embodiment also avoids ~~the~~ light absorption by ~~the~~ a light guide plate or ~~the~~ a light diffusion plate as manifested in prior art. Compared with the first embodiment, the wedge-shaped light guide plate and the reflection film of the second embodiment altogether allow the backlight system to occupy less space while retaining or even enhancing the reflection effect, because the

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wedge shape of the light guide plate can result in a more uniform reflection. The addition of the brightness enhancing plate ~~could~~ can enhance the utilization efficiency of the light while only requiring a ~~little~~ slightly larger volume. ~~[[So]]~~ Therefore the second embodiment provides a higher intensity light and occupies less space. It could be applied to high end products, ~~[[to]]~~ in which performance is considered relatively more important than price.